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Environmental Protection Agency (EPA) Audits of State and Local Inspection/Maintenance Programs

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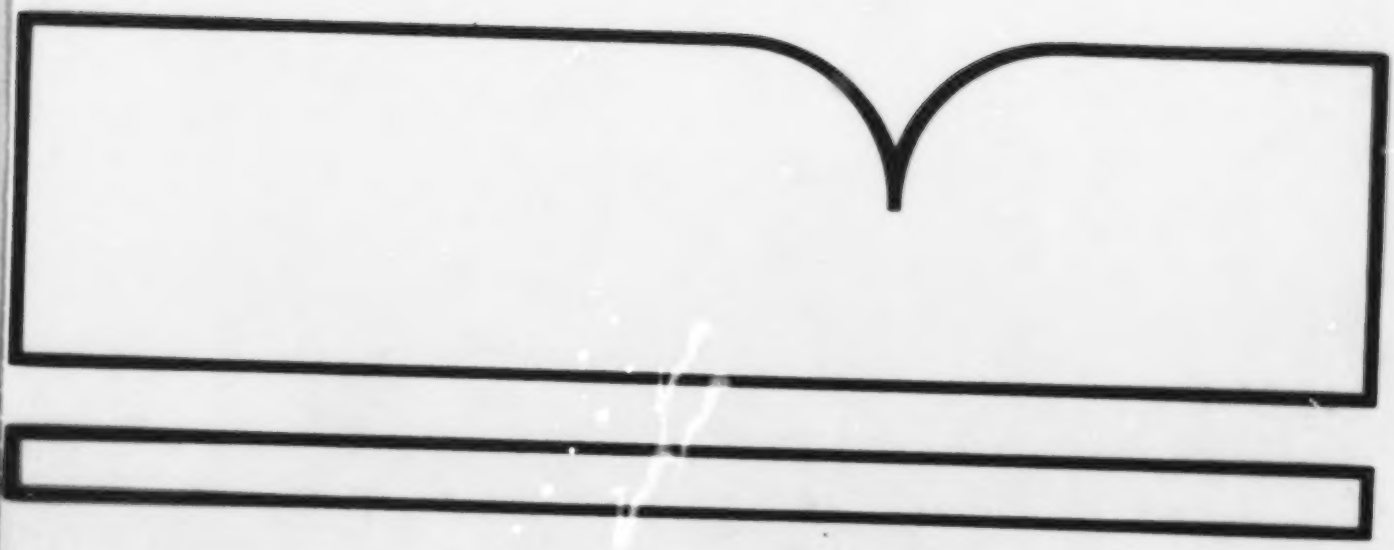

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EPA AUDITS OF STATE AND LOCAL INSPECTION/MAINTENANCE PROGRAMS

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This paper was presented at 78th Annual Meeting and Exhibition of the Air Pollution Control Association in Detroit, Michigan, on June 18, 1985.

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16. ABSTRACT

Many State and local agencies have implemented vehicle emissions I/M programs in the last few years. EPA began to audit these programs in federal fiscal year 1984. The audit process for I/M was developed in conjunction with STAPPA/ALAPCO; the I/M audit became part of the National Air Audit System in fiscal year 1985. Results of the I/M audits indicate that 1) enforcement is a problem in some programs with sticker based enforcement; 2) low reported failure rates are a problem in many decentralized programs, especially government programs; 3) high waiver rates are a problem in some programs, both centralized and decemtralized, 4) analyzer quality assurance ranges from excellant in centralized, contractor progrms to marginal in decentralized programs with manual analyzers and in some centralized government run programs 5) data analyses are not being effectively used in most programs to monitor and improve program performance and the performance of individual inspection stations; 6) the qulaity of I/M repairs is a problem, to some extent, in every program audited. EPA believes that the resolution of these problems generally rests with each State/local I/M program developing an overall I/M quality assurance program to ensure that problems are identified and resolved in a timely manner.

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Abstract

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EPA AUDITS OF STATE AND LOCAL INSPECTION/MAINTENANCE PROGRAMS

1.0 Introduction/Background

As a result of the Clean Air Act Amendments of 1977, many motor vehicle inspection and maintenance (I/M) programs have been implemented across the nation. I/M programs are currently operating in twenty-five States and the District of Columbia (see Table 1). Approximately thirty million vehicles undergo inspections annually in these programs.

I/M is not a new idea. A few programs date back to the mid 1970's; however, most of the current programs are relatively new. Only four programs were operating prior to December 1981 (see Table 1 for program initiation dates).

As more and more of the programs have become operational, EPA has appropriately shifted more emphasis from program implementation issues to program operational issues. In 1983, EPA conducted a survey of thirteen I/M programs to study quality assurance practices in order to provide better technical support and guidance to the operating programs. The purpose of the survey was to identify those quality assurance measures which were being successfully carried out in the field and to share that information nationally. This survey resulted in an I/M Quality Assurance Workshop sponsored by EPA in November 1983, to present the results of the survey to I/M officials. The workshop was attended by State and local I/M officials from practically all States involved in the implementation and operation of I/M programs.

Table 1

Operating I/M Programs
as of February, 1985

Location	Start Date	Location	Start Date
Connecticut	1/83	Memphis, TN	8/83
Massachusetts	4/83	Nashville, TN	1/85
Rhode Island	1/79	Indiana	6/84
New Jersey	2/74	Wisconsin	4/84
New York	1/82	Texas	7/84
District of Columbia	1/83	Missouri	1/84
		Colorado	1/82
Delaware	1/83	Utah	4/84
Maryland	2/84	Arizona	1/77
Pennsylvania	6/84	California	3/84
Virginia	12/81	Nevada	10/83
Georgia	4/82	Idaho	8/84
Louisville, KY	1/84	Oregon	7/75
North Carolina	12/82	Washington	1/82

As a direct result of the survey/workshop and related comments received from State and local officials, EPA's Office of Mobile Sources (OMS) decided early in 1984 that there was a definite need for a national I/M audit system and national I/M audit guidelines. EPA and State and local agencies could use such an audit program (1) to ensure that statutory and State Implementation Plan (SIP) requirements are being met; (2) to assist in developing an acceptable level of I/M program quality; (3) to account for the achievements, shortcomings, and needs of the various I/M programs; (4) to identify programs needing further technical support or other assistance; and (5) to identify technical issues common to all or many programs which need further investigation.

At the time that OMS made this decision, EPA's Office of Air Quality Planning and Standards (OAQPS) was in the midst of a cooperative effort with the State and Territorial Air Pollution Program Administrators (STAPPA) and the Association of Local Air Pollution Control Officials (ALAPCO) to develop and implement the National Air Audit System (NAAS). The NAAS was being developed to serve generally the same desired objectives for the air quality management programs across the country. In NAAS, the EPA Regional Offices are responsible for conducting the individual audits and issuing related audit reports, and OAQPS is responsible for assembling national audit results and issuing an annual national audit report.

After consultations among officials of STAPPA/ALAPCO, OAQPS, and OMS, it was decided that the best approach for developing the I/M audit program would be to add an I/M element to NAAS in federal FY1985. This necessitated the development of the national I/M audit guidelines during federal FY1984. In keeping with the NAAS process, a STAPPA/ALAPCO I/M subcommittee was formed to work with OMS in developing the national I/M audit guidelines. With the help of STAPPA/ALAPCO and I/M officials around the country who served as reviewers, the I/M audit guidelines were developed on schedule and appear as Chapter 6 of the National Air Audit System Guidance Manual for FY85 (EPA-450/2-84-008; December, 1984). The I/M audit guidelines were developed in conformance with generally accepted government auditing standards as contained in the report: "Standards for Audit of Governmental Organizations, Programs, Activities, and Functions," (U.S. General Accounting Office, 1981 Revision).

2.0 I/M Audit Schedules and Plans

EPA started the I/M audit program in federal FY1984 when eight pilot audits were conducted during the spring and summer of 1984. (See Table 2 for the FY1984 audit schedule.) The eight pilot audits were used to test auditing concepts intended for use in the formal I/M audit guidelines as well as to get a start on the task of auditing the twenty-five operating I/M programs. As displayed in Table 2, the FY1984 I/M audit schedule was designed to cover a cross-section of program types in order to properly test the audit concepts. Because the I/M programs in many States are relatively new programs, it was decided at the onset that an audit should not be conducted until the program was in operation for about a year. This gives State and local agencies an opportunity before an audit to resolve any start-up problems which can sometimes occur with any new program. In addition, only after a year are sufficient operating data available (e.g., failure rates, waiver rates, compliance rates) to enable the auditors to identify trends and pinpoint problem areas.

Table 2

FY1984 I/M Audit Schedule

Location	Dates	Program Type*
Connecticut	5/14 - 5/16/84	A
Massachusetts	5/16 - 5/18/84	D
Colorado	5/21 - 5/23/84	C
Arizona	5/23 - 5/25/84	A
District of Columbia	6/04 - 6/06/84	B
Virginia	6/06 - 6/08/84	C
Memphis, TN	6/27 - 6/29/84	B
New Jersey	7/10 - 7/13/84	BC

*A = centralized, contractor
B = centralized, government-run
C = decentralized
D = decentralized with computerized analyzers

The FY1985 I/M audit schedule appears in Table 3. The majority of the FY1985 I/M audits will involve decentralized programs (six of eight). All of the programs, except the Texas (Harris County) program, will have been in operation for at least one year at the time of the audits. In the case of Texas, the program will have been in operation only nine months. The Texas program was originally included in the FY1985 audit schedule because of its planned implementation date of April 1984. Although, program start-up slipped to July 1984, it was decided to keep Texas in the FY1985 schedule because of its special characteristics. The Texas I/M program is the only I/M program implemented to date which relies exclusively on the inspection and repair of tampered and otherwise defective emission control system components rather than basing the determination of the need for maintenance on emissions short tests.

Table 3

FY1985 I/M Audit Schedule

Location	Dates	Program Type*
Nevada	10/15 - 10/19/84	C
New York	12/10 - 12/14/84	D
Georgia	1/22 - 1/25/85	C
Missouri	3/04 - 3/08/85	C
Delaware	3/07 - 3/08/85	B
North Carolina	3/18 - 3/22/85	C
Texas	3/26 - 3/27/85 4/02 - 4/04/85	C
Oregon	4/15 - 4/19/85	B

*B - centralized, government-run
C = decentralized
D = decentralized with computerized analyzers

In addition to the audits currently scheduled in FY1985, there will be follow-up I/M audits conducted in several States which were audited in FY1984. The follow-up audits will focus on specific aspects of the programs where problems were identified or which could not be fully evaluated during the previous audit visits.

In FY1986, EPA plans to audit all remaining I/M programs which will have been operating for one year. Table 4 lists the locations where I/M audits are anticipated for FY1986. Follow-up I/M audits will again be conducted in FY1986 to address identified problems and areas needing further investigation.

Table 4

Planned I/M Audits in FY1986

Location	Program Type*
Maryland	A
Pennsylvania	D
Louisville, KY	A
Nashville, TN	A
Indiana	B
Wisconsin	A
Utah	C
California	D
Idaho	C
Washington	A

*A = centralized, contractor
B = centralized, government-run
C = decentralized
D = decentralized with computerized analyzers

3.0 Audit Process for I/M Programs

As embodied in the NAAS, the I/M audit process contains four elements:

1. Audit preparation.

2. Audit visit.

3. Development of the audit report.

4. Audit follow-up.

The preparation for the audit allows the auditors to familiarize themselves with the design and operations of the program under review and to identify those particular aspects of the program which may need special emphasis during the audit visit. Proper preparation will allow the auditors to establish priorities for various audit activities in order to make efficient use of the limited time available during the audit visit. It will also reduce the State/local resources needed to cooperate with EPA in the audit and the disruption of the I/M program itself.

The auditors assigned to perform the audit must collectively possess as much knowledge as possible about the operations of I/M programs in general and about the specific details of the program under review. The goal of audit preparation is to learn the basic design of the I/M program, to identify as much as possible about the operating characteristics of the program, and to determine as much as possible about the potential strengths and weaknesses of the program. To accomplish this, EPA auditors assemble and review documentation on the program to be audited including (1) program rules and regulations, (2) operating manuals or procedures, (3) operating reports, (4) documentation of previous audits or investigations, and (5) routine correspondence to and from program officials, citizens, and other interested parties. To facilitate audit preparation, the I/M audit guidelines include an I/M program questionnaire which contains questions covering the relevant aspects of an I/M program.

The audit visit is for the purpose of verifying and documenting whether the program is being properly administered, operated, and enforced according to established laws, rules and regulations, and procedural requirements in the SIP. Additionally, the audit visit allows a better evaluation of program effectiveness and efficiency. The audit visit is planned and coordinated with State/local agencies in order to minimize the level of intrusion and disruption of normal program activities and to make the best use of both EPA and

State/local resources. The activities normally undertaken during the audit visit include:

1. Initial meeting with program officials.

2. Interviews with key personnel.

3. Review of program records on inspections, waivers, enforcement, and station surveillance.

4. Inspection station visits to audit analyzers, observe inspections, observe waiver processing, and check records.

5. Special surveys which may include enforcement surveys, idle emissions testing surveys, and/or tampering/misfueling surveys.

6. Interviews with appropriate non-agency persons with knowledge of the program.

7. Exit meeting with program officials.

The audit report must properly and objectively reflect the findings of the audit, both positive and negative. The audit report should specifically identify:

1. The strengths of the program.

2. Any identified operating deficiencies relative to the approved SIP for which program improvements must be implemented.

3. EPA recommendations for correction of these deficiencies.

4. Any aspects of the program which need further study; this would include suspected but unverified operating problems, aspects of the SIP design itself which appear inadequate, or areas where EPA can suggest optional minor modifications which would improve program effectiveness or efficiency.

5. EPA efforts to coordinate the audit report with the State/local agencies; this would include a discussion of any improvements or commitments already made by the State/local agencies as a result of the audit; official comments of the State/local agencies on the draft audit report will be solicited and appended to the audit report.

EPA staff will plan follow-up activities as necessary to encourage and assist State or local implementation of the improvements discussed in the audit report. In cases where deficiencies must be corrected, follow-up audit visits may be necessary after corrective actions have been implemented.

4.0 Results of Completed Audits

As one would expect, each I/M audit thus far conducted has identified some operating problems. In some cases, only minor problems were identified. In a few cases, very serious problems were encountered. In a few cases, the State/local agencies were already aware of problems and were taking steps to resolve them. In every case, EPA is conducting follow-up activities as necessary to work with and assist the State/local agencies in correcting identified problems.

The following general findings have resulted from the completed I/M audits:

1. Enforcement - EPA auditors found that the rate of compliance among vehicle owners ranged from greater than 95 percent in some States to less than 50 percent in other States.

   Three enforcement methods are currently used in I/M programs:

   1. Registration based enforcement.

   2. Sticker enforcement.

   3. Data-link enforcement.

   The I/M audits have not identified any problems in registration enforcement programs, although these systems have potential problems with motorists improperly registering their vehicles outside the I/M area to avoid the program, with police failing to ticket vehicles for expired license plates, and with clerical errors in the registration process which might allow uninspected vehicles to be registered. No audits have yet been conducted for programs which use data-link enforcement.

   The enforcement problems that have been identified in the I/M audits are with sticker based enforcement. Of the first eight sticker enforcement programs audited, four had serious levels of non-compliance (in excess of 20 percent of vehicles in non-compliance).

   The problems in sticker-based enforcement programs tend to be caused by the indifference of police officers to sticker violations and by the failure of police departments to devote the necessary resources or to accept the risk to public goodwill. In some cases, there are also problems because of an inability of police officers to distinguish subject vehicles from exempt vehicles and to distinguish expired stickers from valid ones. Limitations are also imposed in some cases because police are not authorized to ticket parked vehicles.

Another problem area in some programs was sticker accountability. EPA auditors found that some programs have very thorough sticker accountability procedures while others do not. In order to ensure the proper disposition of stickers, State/local agencies need to confirm that each approval sticker has a matching inspection record showing passing results. (This same confirmation is needed in non-sticker programs for approval certificates, except where the approval certificates and official inspection reports are printed automatically by machine.) This confirmation is accomplished in some current programs by correlating sticker serial numbers to inspection reports and then reviewing inspection records, sticker records, and sticker supplies during audits. In programs with automated data collection, sticker serial numbers can be easily recorded in the inspection report and reviewed through routine data analysis. Because of the potential for data loss in some of these systems, State/local agencies need to be cautious about totally relying on the automatic records.

2. Reported failure rates - EPA auditors found reported failure rates as high as 35 percent and as low as 2 percent.

   Reported failure rates were consistently much lower than (less that half) the designed failure rates in decentralized programs. (One exception was a decentralized program with computerized analyzers.) Also, there were low failure rates reported in one government run, centralized program. The contractor, centralized programs all had reported failure rates in the designed range.

   There are several reasons for the low failure rates. In a few cases, the failure rates are low because the I/M cutpoints are too lenient. However, most of the problems with low reported failure rates, especially in decentralized programs, are caused by either pre-inspection repairs, cheating by inspectors, or some combination of these two factors. EPA believes that a strong inspection station surveillance program is needed to ensure proper station performance. This surveillance program should include regular station audits, spot checks with unmarked vehicles, and the ability to gauge and track station performance through data analyses. Spot checks with unmarked vehicles set to fail inspection should be considered an indispensable part of the oversight function in a decentralized program, particularly a program with manual analyzers.

3. Waiver rates - EPA auditors found that waiver rates varied considerably among the programs audited. A few programs do not allow waivers. In some States, the waiver rates appeared excessive (greater than 10 percent of failed vehicles receiving waivers). In one State, the overall waiver rate was about 13 percent of failed vehicles. In another case, approximately 50 percent of the 1981 and newer vehicles which failed were receiving waivers.

   The reasons for the excessive waivers varies to some extent with the type of program. In centralized programs and other programs where the State/local agencies process waiver applications, the problem tends to be a failure on the part of the agency to adhere to strict processing procedures. In such cases, vehicles which receive improper or irrelevant repairs are granted waivers as long as the repair cost ceiling, and other criteria if any, are met. If repair facilities have learned that owners never have to return for a better repair, they have much less incentive to perform only relevant repairs and to perform them correctly. To date, program officials in centralized programs have not spent the effort to create other motivations for good repairs and to find the repair facilities most in need of improvement.

   In decentralized programs where the inspection stations have the authority to grant waivers, high waiver rates tend to be caused primarily by a lack of close scrutiny by the State/local agency. In these cases, the agencies do not track waiver rates by inspection station and do not investigate questionable waiver transactions. Waiver rates seem to be particularly high in those decentralized programs which use mandatory repair sequences (i.e., all or some failed vehicles must have dwell, timing, air/fuel ratio, and idle speed adjustments only) rather than cost limits.

   In decentralized programs where the State agencies process all waivers, the waiver rates are surprisingly low. In fact, the waiver rates in some cases are so low that it reinforces the suspicion that vehicles are not being failed correctly at reinspection.

   In some cases, a secondary problem contributing to high waiver rates in both centralized and decentralized programs is the use of relatively low waiver cost ceilings. Over half of the current operating programs have waiver cost ceilings of $55 or less.

4. Analyzer quality assurance - EPA auditors found quite a variation in analyzer quality assurance among the audited programs. In the centralized, contractor programs, analyzer quality assurance was excellent. However, in decentralized programs with manual analyzers and in some centralized, government run programs, analyzer quality assurance was marginal. These problems were caused by several factors:

   a. Lack of a comprehensive program of preventive and corrective maintenance.

   b. Lack of thorough audit/surveillance activities for inspection stations.

   c. In some cases, existing analyzers are rather old.

5. Data analyses - EPA auditors found that, with only a few exceptions, I/M programs are failing to effectively use available program data to monitor and take steps to improve program performance and performance of individual inspection stations. Of the programs audited, only one had routine and timely data analyses which included more than failure rates by model year and a few other overall statistics.

   In cases where inspection data are collected manually, there are a number of problems which prevent, or at least limit, the collection of accurate data. In some cases, records are illegible and therefore unusable. A more serious problem, and one that is more difficult to resolve, is that in many cases inspectors do not correctly record data. EPA auditors found that manually collected data records often contain easily identified patterns of record keeping (or other) abuses. In most cases, however, the State/local agencies tend to categorize the problem as inevitably poor record keeping practices rather than attempting to resolve them. While true record keeping abuses of themselves may not be serious, there is no way to analyze the data to distinguish between record keeping errors and more serious infractions, such as falsification of test results in order to improperly pass a vehicle with high emissions or to avoid inspecting a vehicle at all. By screening inspection data, agency field investigators should be able to identify questionable transactions or problem stations. Therefore, EPA considers emphasis on collecting and analyzing valid data to be a high priority.

   In cases where data are collected automatically, the data are generally available to program officials, although there have been problems with data loss in some cases. The problem in these cases tends to be an inability to use

the data effectively. In some cases, the State/local agencies have placed little priority on developing computer programs to analyze data. In other cases, the data is over-analyzed with many useless reports being generated. This latter situation often leaves the program managers overwhelmed by the data and confounds their ability to focus on the useful reports.

6. Quality of I/M repairs - EPA auditors found that in every program, to some extent, a problem exists with respect to the quality of I/M repairs.

State and local agencies are providing minimal attention to assurance of quality repairs to failed vehicles. All too often it appears that vehicles are adjusted to meet I/M cutpoints with a small margin of safety rather than being adjusted near manufacturer specifications. This results in much lower emissions reductions being achieved.

5.0 Conclusion

EPA believes that the resolution to the problems in operating I/M programs generally rests with each State/local I/M program developing an overall I/M quality assurance program to ensure that problems are identified and resolved in a timely manner. Through such systems, program managers need to track:

1. The level of non-compliance among vehicle owners.

   This is particularly important in non-registration enforcement systems. However, even registration enforcement is not necessarily exempt from problems.

2. The performance of inspection stations to make sure that vehicles are receiving fair, equitable, and accurate inspections.

   This involves inspection station audit and surveillance activities as well as tracking performance through data analysis. The latter is possible only if accurate data are collected.

3. The performance of the program itself.

   Program data need to be summarized and analyzed to ensure that cutpoints, failure rates, waiver rates, and other program statistics are within acceptable limits.

4. The quality of repairs.

   Quality repairs are the backbone of I/M. Program data need to be reviewed to ensure that vehicles are not being improperly or incorrectly repaired. Retest failure rates and comparisons of before- and after-repair emissions levels can be useful indicators to assess the quality of I/M repairs.

Identifying operating problems is as important first step in providing quality I/M programs. The results of completed audits are already being used by State/local agencies and EPA to improve I/M programs. EPA believes that the I/M audit system and guidelines will continue to be a dynamic process for achieving environmental results.